Family Alarm Messages

Displayed alarm message reduction

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Introduction

The local station alarm scan logic was designed to scan all data for alarm conditions at 15 Hz. This allows for potentially an enormous number of alarm messages to emanate from any local station, to an extent that any alarm display system can become overwhelmed. When the system being monitored is operational, and no alarm messages are forthcoming, it is comforting to know that the system is being watched very carefully, and nothing is being noticed that is out-of-limits. But when the system being monitored is not operational, an alarm screen can become so full that it is all but useless.

Various schemes have been suggested for overcoming this great disparity between what a human can interpret and what the control system can report. In the accelerator control system (Acnet), collections of devices are grouped together, such that entire sets of devices can be included or excluded from the alarm scan easily. In this way, a subsystem that is down for some period of time can be excluded from the alarm scan so that it does not contribute to filling up the alarm screen. Of course, the act of excluding a group of devices from the alarm scan brings with it a responsibility of later on including them when the subsystem is again considered operational.

This note discusses an idea that could be implemented in the local station system to support inclusion / exclusion of sets of devices from the alarm scan. The idea stemmed from an informal discussion with Harrison Prosper about reducing the alarm congestion for the D0 control system, in which the local stations play a major role. A special consideration for the D0 case is the slowness of access to the Hdb database, based upon Rdb from DEC.

General idea

Define a group of devices known to the local station via its local database. A control action is used to enable or disable the entire “family” of devices for alarm scanning. This control action itself affects a family device which can be in the alarm scan, serving to provide a alarm message reminder that the family is excluded from the alarm scan. The opposite control action restores the alarm scanning of the family of devices and also removes the reminder message.

Details of how it works

Consider analog channel devices only. Each analog channel's descriptor entry has a "family" word field. The value of this field is a "delta" channel number which, when added to the device's channel number, produces the channel number of the next member device of the family. The delta value can be positive or negative; thus, one can define an entire circular chain of devices that constitute a family. Beginning at any member of the chain, one can find all the members of the family. To do this easily from another system, there is a listype (#49) which can return the complete list of channel numbers of the family to which a given channel belongs.

This family implementation was originally designed to bring together all channels that relate to a V177 timer board; for example, a set of channels might be used to hold a clock event number that is selected to trigger the delay whose value is given by a different channel. It is limited in that there is only one family word per channel; thus, a channel can belong to at most a single family.

This proposal uses the family word to define a group of devices for the purpose of including or excluding them from the alarm scan. Due to the above limitation, such groups of devices must be distinct; a channel cannot be part of two different groups. Of course, family membership does not prevent any channel from being excluded from the alarm scan. One would want to define such groups such that they would normally all be included or all be excluded from the alarm scan.

The control action that would perform the group inclusion or exclusion could be supported by a new analog control type designed for this purpose. Each such family group of channels could include a special pseudo-channel that would be the target channel used to perform this function. Setting the channel to a nonzero value could cause the family members to be excluded from the alarm scan. The analog control processing would involve following the family chain and removing each such channel from the alarm scan, in such a way as to mark that this has been done, by setting another alarm flag bit, say. The special channel member, however, would not be removed. Also, its reading could be set to the number of devices in the family which were marked as removed from the scan. Its nominal and tolerance values could be set to 0, so that an alarm condition results from performing the exclusion control function when any member of the family is in the alarm scan.

Later, when restoration of the alarm scanning of the family is desired, a zero value could be used to set the special channel. The family chain would again be followed, and all channels which had been marked for temporary exclusion from the alarm scan would be restored to inclusion. The reading word of the channel would be set to zero, thus removing the alarm condition of the special channel. In

As a refinement, the nonzero value used to set the special family channel could be a limit of the number of channels to scan in the family. But this may introduce an element of confusion that would be hard to recover from. Any nonzero value should probably cause a complete scan of the family.

Digital case

What about the digital alarms? The above discussion only addressed analog channels. Binary bits have no family word, so the same approach could not be used. But there is recent support for composite status words, which could be used to reduce the number of binary bit alarms. Collections of bits from up to 8 bytes can be grouped together into as many as 16 bits and assigned as the reading word of a channel. The nominal and tolerance words of that channel are marked to be treated by the alarm scan logic as a nominal digital pattern word and a mask word, according to a bit in the alarm flags word. In this way, one can get up to a 16:1 reduction in binary alarm messages.

In addition, these resultant channels can be included in the family assign ment above, so they can also be included / excluded along with other analog channels.

Conclusion

The scheme presented here is not the fancy AI-inspired approach to trimming down alarm messages that are displayed such that only the ones the viewer wants to know will be displayed. But it can be easily implemented and can reduce considerable alarm message congestion. It has a reminder feature so that excluded groups are not forgotten. It is also potentially very fast, as the group logic is managed locally. A host-level program would need to be written to manage the definition and display of the family groups.